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CLAIMS

1. A DC-DC converter of a charge pump type,
comprising:

5 a constant voltage circuit part configured to
convert an input voltage into a first voltage and output the
first voltage from a first output terminal;

 a charge pump circuit part configured to convert the
first voltage input from the constant voltage circuit part
10 into a second voltage and output the second voltage from a
second output terminal;

 a current detection circuit part configured to
convert an output current of the constant voltage circuit part
into a third voltage and output the third voltage;

15 a first output voltage detection circuit part
configured to detect the first voltage at the first output
terminal and generate and output a first detection voltage
proportional to the detected first voltage;

 a first overcurrent protection circuit part
20 configured to compare the output third voltage and the output
first detection voltage and reduce the output first voltage
and the output current of the constant voltage circuit part
when the output third voltage is higher than the output first
detection voltage;

25 a second output voltage detection circuit part

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configured to detect the output second voltage of the charge pump circuit part and generate and output a second detection voltage proportional to the detected second voltage; and

a second overcurrent protection circuit part

5 configured to compare the output third voltage and the output second detection voltage and reduce the output first voltage and the output current of the constant voltage circuit part when the output third voltage is higher than the output second detection voltage.

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2. The DC-DC converter as claimed in claim 1, wherein the first output voltage detection part generates and outputs the first detection voltage so that the first detection voltage is higher than the second detection voltage
15 when the output first voltage of the constant voltage circuit part is higher than the output second voltage of the charge pump circuit part.

3. The DC-DC converter as claimed in claim 1, wherein the first overcurrent protection circuit part operates
20 when the output first voltage of the constant voltage circuit part is lower than the output second voltage of the charge pump circuit part.

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4. The DC-DC converter as claimed in claim 1,

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wherein the second overcurrent protection circuit operates when the output second voltage of the charge pump circuit part is lower than the output first voltage of the constant voltage circuit part.

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5. A DC-DC converter of a charge pump type, comprising:

a constant voltage circuit part configured to convert an input voltage into a first voltage and output the first voltage from a first output terminal;

a charge pump circuit part configured to convert the first voltage input from the constant voltage circuit part into a second voltage and output the second voltage from a second output terminal;

15 a current detection circuit part configured to convert an output current of the constant voltage circuit part into a third voltage and output the third voltage;

a first output voltage detection circuit part configured to detect the first voltage at the first output terminal and generate and output a first detection voltage proportional to the detected first voltage;

20 a first overcurrent protection circuit part configured to compare the output third voltage and the output first detection voltage and reduce the output first voltage and the output current of the constant voltage circuit part

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when the output third voltage is higher than the output first detection voltage;

second output voltage detection means for detecting the output second voltage of the charge pump circuit part and
5 generating and outputting a second detection voltage proportional to the detected second voltage; and

second overcurrent protection circuit means for comparing the output third voltage and the output second detection voltage and reducing the output first voltage and
10 the output current of the constant voltage circuit part when the output third voltage is higher than the output second detection voltage.